Part 2: Characteristics of Landfill Gas Utilization Projects

Presented by:

Shelley Cohen

U.S. Environmental Protection Agency

Landfill Methane Outreach Program (LMOP)

June 25, 2001

Training Workshop

Sao Paulo, Brazil

Presentation Outline

- Determining if a site is a good candidate for landfill gas utilization
  - Site Characteristics
  - Waste Type and History
  - Site Conditions
  - Utilization Options
  - Community Acceptance
  - Other factors

Site Characteristics

- **Site Location**
  - Landfill still receives waste (or is recently closed)
  - Landfill is near the power grid or industry that could use the gas
  - Landfill has land available for alternative applications
- **Site Acceptance**
  - Landfill gas utilization project is accepted by the local government and community

Determining Methane Production Potential

- **Quantity of Waste in the Landfill**
  - 1.2 million metric tons of waste in place
- **Waste Composition**
  - Organics produce high quantities of methane
- **Waste Placement History**
  - Older waste produces less methane

Site Conditions

- **Status of Landfill Operation**
  - Open
  - recently closed (less than 5-7 years)
- **Landfill Type**
  - Managed Landfills
    - daily cover
    - compaction
    - final cover
  - Open Dumps
    - present challenges
- **Landfill Depth**
  - greater than 10 meters

Climate and Moisture Levels

- Climate
  - More than 10 cm of rain annually
- Management of Moisture in the Landfill
  - Leachate Management
  - Landfill Stability

Other Considerations

- **Geology/ Hydrogeology**
  - Lined landfill site
  - Unlined landfills produce higher methane generation if located in soils that have low permeability, such as clay
- **Temperature**
  - methane production is maximized between 50-60 degrees Celsius

Brazil: Ideal for Landfill Gas Utilization

- Brazil has many landfills
- High levels of waste continue to go to landfills
  - Brazil generates 240,000 tons/day
  - Growing industrialized product consumption
  - 70% of waste generated is collected for disposal
  - Less than 2% recycling

Brazil: Ideal for Landfill Gas Utilization

- Moisture Level of Waste
  - The municipal waste in Brazil has high moisture content due to more organic materials
  - Approximately 60% of waste from Brazil's capital is organic.
  - Over 50 cm/rainfall per year in northern Brazil
  - Over 100 cm/rainfall per year in southern Brazil
- The high amounts of organic compounds and rainfall produces more methane rapidly, but over a shorter period of time.

Brazil: High Energy Demands

- Electricity consumption: 336.242 bil kWh
- Electricity productivity by source:
  - Fossil fuel: 4.92%
  - Hydro: 91.02%
  - Nuclear: .99%
  - Other: 3.07% (1998est)
- With continued economic expansion of about 4% per year requiring energy resources to grow by 65% from 1996-2006, Brazil's runs the risk of increasing energy dependency on fossil fuel or hydropower dams

Brazil: High Energy Demands

- Energy Crisis
  - Cut consumption by 20% over the next 6 months
  - Conservation measures went into effect June 1
- Global News Coverage
  - *Energy Crisis Leaves Brazil in Perpetual Twilight*
    - Monday, June 18, 2001, Reuters News Service
  - *Energy Crisis in Brazil is Bringing Dimmer Lights and Altered Lives*
    - Monday, June 6, 2001, New York Times
- Landfill Gas can help offset some of Brazil's energy needs

Utilization Options for the Landfill Gas

- Are there uses for the energy recovered… A Test
- Direct Use
- Electricity Generation
- Gas Processing
- Emerging Technologies

Are There Uses For The Energy Recovered?

- **Ask yourself these questions, are there….**

1) Residential areas that could use a supplemental source of fuel?

2) District heating plants that can use medium quality gas?

3) Industrial facilities nearby that can use medium quality gas?

4) Medium-quality gas distribution networks?

- **Additionally...**

5) Are high-quality gaseous fuels very costly, making gas processing potentially cost effective?

6) Are there electric power distribution systems that do (or can) obtain power from project such as landfills?

7) Would you consider gas recovery as a lost-cost alternative approach for reducing methane emissions even if it is not profitable in its own right?

Identify Other Favorable Options

- **Find Supportive Project Partners**
  - **Regulatory Agencies**
  - **Utility Companies**
  - **Governmental Agencies**
  - **Private Industry**
  - **Adjacent Land Owners and Residents**
  - **Multi Lateral Banks**
  - **Financial Institutions**